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THE GEOGRAPHY OF YUGOSLAVIA

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The larger part of Yugoslavia occupies the central and northwest portion of the Balkan Peninsula (74 percent of its territory), while the smaller, northern part projects into Middle Europe. Yugoslavia is situated between 40 51 20 and 46 53 North latitude, and between 13 23 12 and 23 02 East longitude. The extreme latitude range is 6 01 40 North, and in longitude 9 38 48 East. The southernmost point is Prespa Lake, south of Velika Gradina Island, and the northernmost is where the Yugoslav, Austrian, and Hungarian frontiers meet. The westernmost point is southwest of Visoka Kanina (2,585 meters) on the Yugoslav-Italian frontier, and the easternmost is at the top of Cengino Kale in Maleske Planine.

Yugoslavia is bounded on the north by Austria and Hungary, on the east by Rumania and Bulgaria, on the south by Greece, and on the west by Albania, Italy, and the Free Territory of Trieste. According to available information, the Austrian frontier is 323.7 kilometers long (this refers to the present frontier); the Hungarian, 623.3; Rumanian, 557; Bulgarian, 536.1; Greek, 262.1; Albanian, 465.5; Italian, 175; and the Free Territory of Trieste, 83.5 kilometers.

The Adriatic seacoast, from the Bojana River to the Mirna River, is 1,916.1 kilometers long (not including islands).

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AREA

Yugoslavia has an area of 256,589 square kilometers (Melik Anton, Yugoslavia, a book published in August 1948).

The People's Republic of Serbia has an area of 88,563 square kilometers, of which the Vojvodina, an autonomous province, occupies 22,488 square kilometers and the Kosovo-Metohija Autonomous Oblast, 10,351 square kilometers. The People's Republic of Serbia comprises 34.5 percent of the total area of the Federal People's Republic of Yugoslavia (the Vojvodina, 9 percent; Kosovo-Metohija, 4.1 percent).

The People's Republic of Croatia has an area of 55,937 square kilometers. Before a part of the seaboard, Istria, Zadar, Rijeka, Lastovo Island, and others were included, the area was 52,539 square kilometers. Accordingly, the area of added territory is 3,398 square kilometers. The People's Republic of Croatia comprises 21.8 percent of the total area of the Federal People's Republic of Yugoslavia.

The People's Republic of Slovenia has an area of 20,192 square kilometers. Before a part of the Slovenian seaboard and a part of Istria were added to the People's Republic of Slovenia, the area was 16,229 square kilometers. Accordingly, the area of the added territory is 3,963 square kilometers. The People's Republic of Slovenia comprises 7.9 percent of the total area of the Federal People's Republic of Yugoslavia.

The People's Republic of Bosnia-Herzegovina has an area of 51,564 square kilometers, or 20.1 percent of the total area of the Federal People's Republic of Yugoslavia.

The People's Republic of Macedonia has an area of 26,494 square kilometers, or 10.3 percent of the total area of the Federal People's Republic of Yugoslavia.

The People's Republic of Montenegro has an area of 13,387 square kilometers, or 5.4 percent of the total area of the Federal People's Republic of Yugoslavia.

RELIEF

Yugoslavia is largely mountainous; 75 percent of its area consists of hills and mountains and only 25 percent consists of plains, valleys, karst regions, and river valleys. Yugoslavia's relief is heterogenous and consists of almost all forms -- tectonic, fluvial, volcanic, karst, eolithic, etc., and can be divided into several large morphological units: the Adriatic seacoast and islands, the western zone of younger folded mountains, the central zone of old mountains, the eastern zone of folded mountains, and the Timok basin.

The Adriatic seacoast and islands represent a narrow and very indented zone. This indentation is the result of submersion of the coastal area beneath the sea. Entire parts of the continent sank and created inlets, bays, valleys, canals, peninsulas, islands, grottoes, etc. The canals, which today separate islands from the coast or islands from islands (Neretva, Korcula, Brac, Ivar, Podgora, Mljet, and other canals), are in fact submerged longitudinal karst valleys and depressions.

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Inlets, bays, and valleys were formed in the same way. The water penetrated through the narrow obstacles into karst valleys and fields and also flooded the lower reaches of rivers. Such is the origin of the Bakar, Sibenik, and Gruz valleys. The Boka Kotorska valley also belongs to this type; it has four bays (Toplanski Zaliv, Tivatski Zaliv, Risanski Zaliv, and Kotorski Zaliv). The Adriatic seacoast has some funnel-shaped, narrow inlets which are in fact flooded mouths of rivers (the Rasa and Mirna rivers in Istria, and the Ombla, Slano, and Martinscica rivers).

While the synclinal depressions and old river valleys became bays through submersion, the low mountain ridges became islands. The islands follow the direction of the Dinaric Mountains and are built of the same rock.

Among the many islands, the largest and most important are the following:

	<u>Sq Km</u>		<u>Sq Km</u>
Krk	407.93	Dugi Otok	117.16
Brac	395.94	Mrjet	97.90
Cres	336.10	Rab	86.08
Hvar	289.04	Vis	85.84
Pag	287.02	Pasman	56.93
Korcula	272.57	Lastovo	52.67
Losinj	175.11	Solta	51.95

The Yugoslav coast also has peninsulas, the largest of which are the Istrian and Peljesac peninsulas.

Between the two lower parts of the coast is the low Kistanska Povra, from which rise the mountains (Mosec Planina, 702 meters; Promina Planina, 1,148 meters) and which is cut by canyon-type river valleys (the Zrmanja, the Krka and its tributary the Cikola, and the Cetina rivers).

The coastal zone consists of limestone and rocks; it has many very well developed karst formations (caves, sinks, valleys, dry plains).

The western zone of younger folded mountains, covering 40 percent of the country, consists of the Alpine, Dinaric, and Sar mountains.

The Alpine Mountains are a mountain belt which extends in a west-to-east direction, indented by the Sava and Soca rivers. The best known mountains are Triglav (2,863 meters), Skrlatica, and Jalovec. The Karavanke and Kamniske Alps belong to this group. Glaciers covered this area in diluvial periods, a conclusion which can be drawn from the relief (cirques, wide valleys, lakes).

The Dinaric Mountains extend from the Kobarid-Tolmin-Skofja Loka line up to Lake Scutari, the Metohija valleys, Sitnica, Ibar, Dicina, and Kolubara, a length of about 700 kilometers. As a whole, this mountain system is in the form of a slowly declining highland, divided by longitudinal parallel ridges which extend in a northwest-southeast direction, with karst fields, depressions, valleys, and river valleys between the ridges. The Dinaric Mountains are divided by transversal valleys in three parts: northern, central, and southern. The northern part, extending from the Julian Alps to the Recina River and Kupa River line, starts with lower mountains in the valleys and develops into higher mountains (Trpovski Gozd, 1,945 meters; Sneznik, 1,796 meters). Here appear all karst formations. Located here is the well known Postojna grotto (over 15 kilometers long), the Skocjan grotto (2.5 kilometers long); and the cave at the village of Raspo, the deepest one in the Dinaric Mountains (380 meters).

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The central part of the Dinaric system (between the Recina and Kupa river line and the Neretva and Zapadna Morava river line) is a limestone mass, especially the western part, where, in addition to other karst formations, there are a great many karst fields. This is the region of genuine Dinaric karst. Here belong Velcbit Planina (1,758 meters), the Kapela and Lika plateaus; and certain areas in western Bosnia and the Dalmatian Zagorje, where parallel mountain ridges alternate with karst fields. Also located here are the well-known plains: Glamočko Polje, Ivanjsko Polje, Duvanjsko Polje, Grahovsko Polje, Sinjsko Polje, Imotsko Polje, and the Svilaja, Mosor, Biokovo, Sator, Cincar, and Crsnica mountains. Toward the more central and eastern parts of this area, shales predominate. The highest mountains in this area are Vlasica, Vranica, Ozren, Romanija (1,629 meters), Majevica, Gucevo, Poveljen, and Maljen.

The following high mountains belong to the southern, highest part of the Dinaric system: Franj (2,155 meters), Bjelasnica (2,067 meters), Treskavica (2,099 meters), Maglic and Volujak (2,238 meters), Bjelasica (2,134 meters), and Komovi (2,484 meters). This part ends in the south with the Prokletije region, in which the highest mountains are the Djaravica (2,656 meters), Bogicevica, Koprivnik (2,522 meters), Hajla (2,400 meters), and Zljev (2,382 meters). The highest Dinaric Mountains are separated by valleys of the Gornja Neretva, Tara, Piva, and Sutjeska rivers. These mountains were covered by glaciers during the diluvial period.

Somewhat lower mountain regions are in the southwest, with the following mountains: Orjen (1,885 meters), Lovcen (1,749 meters), and Rumijsa. This part is also genuine karst. In addition to small karst formations, there are plains, underground rivers, and grottoes, including the Vaternica River, which is over 3 kilometers long, the Doljasnica River, 2 kilometers long, and the Duboki Do cave in Njegusi which is over 340 meters deep.

Northeast of the highest Dinaric Mountains is the Raska highland with mountains of low or medium altitude, such as the Golija (1,833 meters), Javor (1,520 meters), Zlatibor (1,496 meters), and others.

The Sar Mountain system, the third part of the western mountain belt, extends between the Metohija, Polosko, Kicevo, and Prespa depressions to the Greek frontier. Sar Planina, where this system starts, has the highest average altitude among Yugoslav mountains. The best known peaks are Turcin on Rudoka Planina (2,702 meters), Kobilica (2,526 meters), and Ljuboten (2,499 meters). Sar Planina was covered with glaciers during the diluvial period. As far as grass and water are concerned, it is Yugoslavia's richest mountain. Two parallel mountain ranges extend to the south from Sar Planina: one, between the Mavrovo and Ohrid valleys, includes the Bistra, Stogovo, and Galicica mountains, and the other extends along the frontier between Yugoslavia and Albania, which includes the Pastrok, Koritnik, Djalica, Korab, Desat, and Jablanica mountains. Korab Planina (Golemi Korab, peak, 2,764 meters) is second to Triglav in height.

The central zone belongs to the old Balkan mainland and is broken up into a number of massive mountains and valleys. It contains two separate regions: the northern, with plains and valleys; and the southern, in which massive mountains predominate.

The northern region, the Pannonian basin and its periphery, is a depression. The nondepressed parts of this area are the mountains between the Sava and Drava rivers, which include the Fruska Gora, Dilj, Papuk, and other mountains. The Pannonian basin was first under a sea and later under a lake; the receding waters left sedimentary deposits. In the diluvium period, sand and gravel were deposited, and large alluvial plains were created. There are extensive alluvial plains along the Danube, Sava, Tisa, and Tamis rivers (75-90 meters), and wooded surfaces at Telecki and Titel in Backa, Srem, Baranja, and others. Above these wooded surfaces are two sand dunes at Deliblato in the Banat, and Subotica in Backa.

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The southern periphery of the Pannonian basin rises gradually. It consists of a number of abrasion areas which gradually decrease from a height of 850 meters. They are divided by rivers and valleys into hilly, rolling land. Above the area, isolated mountains rise in the form of islands (Avala, Bukulja, Kosmaj, Vencac, Rudnik, Ostrvica, Cer, Vlasic, Majevica, Prosara, and mountains in the Morava area in Serbia and northern Bosnia).

The southern region of the central zone belongs to the Rodopi system. The Morava-Vardar depression continues in the center and consists of a number of valleys (Vranje, Skoplje, Veles, Kavadarci, and others). The main portion of the old Rodopi mass is east of this depression. Mountains and valleys alternate. Well known mountains are Belasica (1,880 meters), Ograiden (1,174 meters), Maleske Planine and Plachovica peak (1,676 meters), Osogovske Planine (2,252 meters), Besna Kobila, and Streser (1,922 meters). Between these mountains are the Strumica, Males, Kocani, and Kriva Palanka valleys. Somewhat younger Rodopi Mountains are found to the west of the Vardar valley: Dudica, Midze and Kajmakalan (2,521 meters), Jakupica (2,540 meters), and Pelister (2,600 meters). Between them is the large Pelagonija area (Prilep-Bitolj basin). The mountains between the Kosovo valley and the Morava-Vardar depression also belong to the Rodopi system (Skopaka Crna Gora, Kopaonik, Jastrebac, and others).

All mountains of the Rodopi system are characterized by very steep slopes and oval tops, remnants of the old highland which was broken up. The highest peaks, such as Pelister and Jakupica, were covered by glaciers during the glacial period. Lakes and rolling formations give evidence of this.

The Vardar depression was under a sea during the Oligocene; later on became a part of the large Aegean Lake, which covered all present valleys. The remnants of that age are lake sediments, abrasion areas, and terraces at the periphery of the valley.

The eastern mountain zone consists of the Carpatho-Balkan system, which extends between the Danube-Morava valley and the Vlasco Pontic basin. This zone is divided into smaller parts by the valleys of the Porecka, Crni Timok, Beli Timok, Trgoviski Timok, and Nisava rivers, and by other small rivers and valleys. Southeasterly, the Balkan mountain system, extending northward to the volcanic Crna Reka valley, Crni Vrh mountain, and Homoljske Planine, includes Stara Planina with Midzor peak (2,169 meters), Suva Planina, Rtanj, and Ozren mountains. Between them are the Crna Reka, Svriljig, and Soko Banja valleys.

The mountains of the Carpathian system, north of the Balkan system, include the mountains: Miroc, Deli Jovan, Veliki Krs, and Homoljske Planine. The eastern mountain zone consists of crystalline schists, granites, sandstone, and limestone. All karst formations, except the plains, are represented in the Beljanica mountain and the Kucajske Planine.

The Federal People's Republic of Yugoslavia occupies a small part of the Vlasco-Pontic basin. This area is east of the Carpatho-Balkan system and includes the Kljuc and Krajina areas, and a part of the Timok basin.

Highest Mountain Peaks in Yugoslavia

Peak	Mountain	Republic	Altitude (m)
Triglav	Julian Alps	Slovenia	2,863
Golemi Korab	Korab	Macedonia	2,764
Skrlatica	Julian Alps	Slovenia	2,738
Turcin	Sar	Macedonia	2,702

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<u>Peak</u>	<u>Mountain</u>	<u>Republic</u>	<u>Altitude (m)</u>
Mangart	Mangart	Slovenia	2,678
Borislajec	Rudoka	Macedonia	2,662
Djaravica	Prokletija	Montenegro	2,656
Jalovec	Julian Alps	Slovenia	2,643
Pelister	Baba	Macedonia	2,600
Crni Vrh	Sar	Macedonia	2,584
Vraca	Vraca	Macedonia	2,582
Grintavec	Kamniske Planine	Slovenia	2,558
Solunska Glava	Jakupica	Macedonia	2,540
Bobotov Kuk	Durmitor	Montenegro	2,522
Kajmakalan	Nidze	Macedonia	2,521
Ljuboten	Sar	Macedonia	2,499
Kom Kucki	Komovi	Montenegro	2,484
Karadzica	Karadzica	Macedonia	2,473
Koritnik	Koritnik	Macedonia	2,394
Maglic	Maglic	Bosnia- Herzegovina	2,386
Golem Rid	Stogovo	Macedonia	2,273
Crni Kamen	Jablanica	Macedonia	2,259
Galica	Galica	Macedonia	2,255
Stol	Karavanke	Slovenia	2,236
Plocno	Cvrsnica	Bosnia- Herzegovina	2,228

GEOLOGICAL STRUCTURE

The geological structure of Yugoslavia is very complicated, because Yugoslavia includes that portion of the Alps which once were a part of the Mediterranean Sea, which had a very labile bottom. Sedimentation took place in this area during several geological periods. Younger mountain ranges of southern Europe were formed through the folding and raising of sedimentary rocks. Because of strong disturbances in various areas of the country, large quantities of hot masses penetrated through the fissures from the earth's center. Thus, some elevated parts of Yugoslavia were changed before the Alps. All these tectonic disturbances and changes explain the complex geological structure of Yugoslavia as well as its rich mineral resources.

There are rocks of different composition and age, from the archaic to the youngest, in Yugoslavia.

The oldest rocks are crystalline schists of archaic age, mostly gneiss, "liskun" schists, amphibolites, and marbles. They form the geological foundation of Yugoslavia and the entire Balkan Peninsula. Their age is estimated at 1.5 billion years. The rocks were subjected to vigorous movements and have been penetrated by eruptive veins so that they are highly enriched with mineral resources. They contain white "liskun" at Prilep, kaolin at Stalac, gold-bearing quartz at Blagojevo, and molybdenite at Surdulica.

During the Cambrian Period (480-580 million years ago), Yugoslavia was mainland. The Mediterranean Sea covered the northwestern portions of the country in the Silurian Period (380-480 million years ago), and later on flooded the area of Kopanik, Skopska Crna Gora, Sar Planina, Korab, and Stara Planina. The Silurian period is represented by limestones, schists, phyllites, and marbles.

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Limestones of the Devonian Period (320-380 million years ago) are found only in the Karavanke and Carinthian Alps.

Vast changes occurred in Yugoslav territory during the Carboniferous Period (260-320 million years ago). The mountains of the Rodopi mass rose and folded. Since that time, they have remained above sea level, like an island. During that period, the ocean extended from Karavanke through Kranjska Gora, Bosnia, Stara Ras-a, Kosovo, and Metohija. The depth of the ocean shifted from deep to shallow, and for this reason sea sediments are found in those parts of the country. Limestones, shales, and sandstones alternate with continental formations and layers of black coal in Lika and Velebit.

A shallow sea existed in eastern Serbia in the first half of the Carboniferous Period, in which phyllites, argillaceous rocks, sandstones, and conglomerates are found. This area was subjected to mild folding in the second half of the Carboniferous Period, which created the foundation for the present Carpathians and Balkans. These areas became mainland at the end of this period, with large swamps in which flora accumulated, from which thin layers of black coal developed in the course of time at Kladurovo, Misljenovac, and Mustanic. Great masses of eruptive rocks, containing many ores (iron) in Serbia and Bosnia, appeared during these movements in the Carboniferous Period.

The Rodopi mass, being the central portion of the mainland between Greece and Hungary, separated a large sea in the western regions from a more or less continental sea in eastern Serbia during the Permian Period (230-260 million years ago).

In western regions, sedimentary sandstones and conglomerates were deposited in shallower water; limestones were deposited in deeper water. A characteristic rock in eastern regions is red sandstone which occasionally contains copper ore.

In the Mesozoic Era (60-230 million years ago), the Rodopi mass remained as the central mainland dividing Yugoslavia into two parts: the western part, into which the Mediterranean Sea continues to invade, and the eastern part, where the sea is shallower. Therefore, there is a difference between the two parts with regard to geological structure and to mineral resources.

At the beginning of the Triassic Period (175-230 million years ago) the western part of Yugoslavia was covered by a shallow sea in which sedimentary sandstones and shales were deposited. They contain sodium chloride and gypsum (at Debar). Later on, in the middle of the Triassic Period, the sea became deeper and thick layers (about 1,000 meters) of sedimentary limestone, dolomite, schist, and sandstone were formed. Many mountains in the western area, from Karavanke in the north to Lake Ohrid in the south, consist of these components. Large quantities of porphyry, melaphyre, and diabase were deposited in the mountains of this area. Baryta, cinnabar, and iron ore (at Cevljanovic, Ljubija, and Vares) are found in this eruptive rock. The decomposition of Triassic limestones created huge deposits of bauxite.

The eastern area was a mainland into which the water temporarily penetrated in the form of a bay.

In the Jurassic Period (115-175 million years ago), limestones, sandstones, shales, and dolomites built many of the Dinaric Mountains. They contain rich bauxite deposits.

Eastern Serbia was covered by a shallow sea, in which sedimentary sandstones and slates were deposited. Layers of black coal were formed in closed basins on the periphery of the sea at Vrska Cuka, Srpski Balkan, and Jerma. Jurassic strata, penetrated by masses of peridotite and serpentine, contain chromium ores at Sar Planina and Skopska crna Gora, and magnesite and asbestos at Cacak, Zlatibor, and Kragujevac.

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During the Cretaceous Period (60-115 million years ago), there were certain movements of the sea and mainland. In the western part of the country, on the bottom of the sea which covered this region, certain movements began which resulted in the elevation of the Dinaric Mountains. Thereby the sea became shallower and mostly coral cliffs were deposited. The highest central portions of the Dinaric Mountains became mainland in that period.

A transgression repeated in the upper Cretaceous Period, and sedimentary limestones and dolomites were deposited in the sea. They created the largest part of Dalmatia and numerous islands, a large number of mountains in Croatia, western Bosnia, Herzegovina, and Montenegro. This sea had a large bay covering western Serbia, Kosovo, and Macedonia. Limestones, sandstones, chalky clays, and clay from the bay are found in the vicinity of Belgrade.

A deep sea covered eastern Serbia in the lower Cretaceous Period, and sedimentary limestones and chalky clay were deposited there. That sea extended to the west over Sumadija. Soon thereafter the sea became shallow, the bottom began to fold at the end of the Lower Cretaceous Period, and some parts of the Carpathians and Balkans became mainland. Coal deposits were formed on the periphery of that shallow sea and in swamps created by folding (Rtanj, Podvis, Dobra Sreca, Tresibaba). In addition, bituminous slates appear here (12 percent bitumen). The disturbances caused the flow of andesite in which copper ores and pyrite are deposited (Bor and Majdanek).

In the Cenozoic Era (600,000-60 million years ago), the orogenic movements which had begun at the end of the Cretaceous Period, continued through the Tertiary Era so that in the middle of the Tertiary Era the water all but completely receded from Yugoslav territory. Mountains of the Alpine, Dinaric, Sar-Pind, Carpathian, and Balkan ranges emerged, and the Rodopi system underwent great changes. Transgressions and regressions alternated during the emersion. Sedimentary limestones, sandstones, slates, and conglomerates were deposited during the water's recession. Such rocks constitute the basis of the western part of the Dinaric, Kozara, and Majevica Mountains. The sea gradually disappeared completely. Brackish lakes remained to form coal basins (Rasa in Istria, Siveric in Dalmatia). Numerous other coal basins are of the same age in other parts of the country: in Serbia, the black coal mines in Resava, Senje, Bogovina, Aleksinac, and Petrovac; in Slovenia, Trbovlje; Vrtnik in Srem; and Zenica, Kakanj, Ugljenik, Breza, and Kreka in Bosnia. Lignites of the Tertiary Era are found at the Kosovo, Kolubara, Kostolac, Zagorje, and other mines.

Chalky clay was deposited in depressions created by oligomiocenic folding.

Vigorous volcanic actions erupted masses of dacite and other rocks containing lead and zinc ores (Trepcu, Janjevo, Novo Brdo, and Kratovo-Zletovo areas). Oil deposits also are Tertiary strata at Medjumurje, Selnica, Paklenica, from Zagreb to Posavina, Sisak, and Brod to Vinkovci. Large deposits of salt were created at the same time in the Tuzla valley. The northern parts of the country were flooded by a sea, coming from the north, at the end of the Tertiary Era. Sedimentary clays, sands, and limestones were deposited. This sea drained through the Danube at the beginning of the diluvial period. Some lakes remained, however, but they disappeared in time. The diluvial period left eddy and wave formations on some of the high mountains, such as Triglav, Prenj, Sar, and Korab.

The following geological units can be identified by this geological development of the country:

1. Rodopi Massif

This consists mostly of crystalline and eruptive rocks. It emerged in the Carboniferous Period, was disturbed in the middle of the Tertiary Era, and represents the core of the country.

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2. Regions of Younger Mountain Ranges

These consist of the Alps, and the Dinaric Mountains. These are composed of various rocks, with Triassic, Jurassic, and Cretaceous limestones predominating. The emersion of these mountains began at the end of the Cretaceous Period and was completed in the middle of the Tertiary Era.

3. Pannonian Basin

This is a plain formed between the mountains. The leveling began at the end of the Cretaceous Period, and was completed in the Oligocene Period. The plain is covered by clays and sands of the Miocene-Pliocene age. Topsoil is the result of wind action.

HYDROGRAPHY

Yugoslavia is rich in stationary and flowing waters. This is the result of the land relief and of the impermeable soil.

Adriatic Sea

The Adriatic Sea, with an area of 135,000 square kilometers, is 800 kilometers long, the average width being 160-170 kilometers. The Straits of Otranto, which connect it with the Mediterranean, are 73 kilometers wide. Half of the Adriatic Sea area belongs to Yugoslavia.

The Adriatic is a depression created in the Oligocene Period through the folding of the surrounding mountains. The water which filled up this basin entered Lombardy as a bay. Alpine rivers filled up this bay with sediments in the diluvial period and created a fertile plain. The Dinaric mainland started to lower at the end of the diluvial period and created numerous islands and canals on the coast. Therefore, the west shore is low and has beaches while the east coast is steep and indented.

The Adriatic Sea is shallow, the average depth being about 250 meters. A submerged barrier, going from Feljeski Kanal through Lastovo and Palagruz islands, divides it into two basins: the northern, which is shallower (50-100 meters deep), and the southern, which is considerably deeper. The deepest point of the Adriatic Sea is approximately in its middle, 80 kilometers south of Boka Kotorska.

The temperature of the Adriatic Sea is somewhat lower than that of the Mediterranean Sea, the reason being that a large mass of cold water is emptied into the Adriatic by the rivers. The temperature is higher out in the sea than near the shore because of the mainland's influence. In winter, it is 7-8 degrees centigrade in the northwest and 14-16 degrees centigrade in the southeast. The differences in temperature are not so pronounced in summer, 25 degrees in the southeast and 22 degrees in the northwest. The water reaches the highest temperature in August and the lowest in February. The Adriatic is very salty and very clear as a result of high temperatures and evaporation.

The transparency decreases from northwest to southeast. The water is most transparent around the deepest areas, 56 meters; and the least transparent at the coast, close to the mouths of rivers.

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The salt content decreases from south to the north. It is 38 percent in the southeast and 33 percent in the northwest. This is the result of larger water influx and lower rate of evaporation in the north.

The Adriatic is never calm. North and south winds (bura and jugo) blow especially from October to February. The northern wind (bura) is a continental wind and is especially strong from Velebit Planina and Biokovo Planina, and causes short, low, but steep, waves (2-2.5 meters). In contrast to the north wind, the south wind (jugo) is warm and damp and causes rolling waves about 50 meters long and 3-5 meters high.

Two ebbs and two floods of the tide appear in the Adriatic every day. They are not high and sharply expressed, since the Adriatic is a bay and has a continental character. The flood tide in the southern portion of the sea is between 20 and 30 centimeters; in the northern portion, it is about one meter. It is 30 centimeters in Dubrovnik; in Susak, 47 centimeters; and in Trieste, one meter. Flood and ebb do not appear in the entire Adriatic Sea at the same time. When there is flood tide in the south, there is ebb tide in the north.

The main movement of the sea is caused by currents. The most important Adriatic current comes from the Ionian Sea, moves along the east coast, and returns along the west coast. The average speed of this current is about 7.2 kilometers a day. It has a favorable influence on the coast because it raises the temperature in the winter. Its speed is 7.5 kilometers south of Kotor Bay and 13 kilometers between Kotor Bay and Vis; it does not exceed 4 kilometers a day in the northern part. Branches separate from this main current and go westward, thereby creating a system of transversal currents, especially between Dubrovnik and Korcula. In addition, there are some weaker currents caused by flood and ebb tides. They are the strongest in canals, especially in the Korcula, Neretva, Podgora, and Kvarner canals.

Rivers

Yugoslavia is rich in rivers. The dense network of rivers is related to the topographic advantages, petrographic soil structure, and annual atmospheric precipitations.

The orographic constellation and geographic situation send Yugoslavia's rivers in three directions: to the Black, the Adriatic, and the Aegean seas.

Because of mountain configuration, the drainage areas are not distributed equally. The Black Sea receives 69.5 percent of the runoff, the Adriatic Sea receives 21.2 percent, and the Aegean Sea receives 9.3 percent of the entire runoff area of the republic.

All three watersheds meet on Crnoljeva Planina. The bifurcation of the Nerodinka River takes place there, in the area close to Urosevac, which sends its water through the Lepenica River into the Aegean Sea and through the Strumica into the Black Sea. The rivers of these drainage areas not only differ with regard to the area of the watershed, but also differ with regard to the water volume, or water level in them, and with regard to the declines.

1. Rivers of the Black Sea Drainage Area

The Danube originates in the Schwarzwald Mountains in Germany. After the Volga, the Danube is the largest river in Europe, the entire length being 2,860 kilometers. Its length in Yugoslavia is 591 kilometers. It has a very large drainage area. About 40 larger rivers empty into the Danube in Yugoslavia alone, the most important being the Sava, Drava, Morava, and Tisa. The average

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depth of the Danube is 4 meters, but there are places where the depth is over 45 meters, as at Kazan (160 meters). The Danube is widest just before it enters the Djerdap Gorge (Iron Gate) at Donji Milanovac (2,000 meters). The Danube flows through the Djerdap Gorge, which is 130 kilometers long. Because of the rapids and cliffs in the gorge, the Srp Canal (2,200 meters long, 73 meters wide, and at the lowest level, 2.4 meters deep) was constructed on the Yugoslav side of the Danube to make normal shipping on the Danube possible.

The Sava is the largest river originating in Yugoslavia. It originates where the Sava Bohinjka and Sava Dolinka meet at Radovljica, and flows into the Danube at Belgrade. Its fall from Zagreb to Belgrade is 45 meters. It has great importance for transportation because of its fall and width. The Sava's right tributaries are the Drina, which originates from the Piva and the Tara and whose most important tributaries are the Lim and its tributary the Uvac, the Djetina, Sutjeska, Praca, Janja, Drinjaca, and the Jadar; the Bosna and its tributaries the Lasva, Usora, Krivaja, and Spreca; the Vrbas and its tributaries the Vrbanja and Pliva, on which there is a beautiful waterfall at Jajce (28 meters high); the Una and its tributary the Sana; the Kupa and its tributaries the Glina and Korana, which carry water from Lake Plitvicka, Krka, the Ljubljanska, and the Kolubara with its tributaries the Ljig and Tammava. The Sava's left tributaries are the Savinja, Sutla, Krapina, Lonja and its tributary the Cazza, the Ilava and its tributary the Pakra, Orlava and its tributary the Londa, and the Bosut with its tributaries the Sudrva and the Spacva, all of which are short rivers which flow through the plain of the Sava River valley.

The Morava River, after the Sava, is the largest Danube tributary. It originates from the confluence of the Binacka Morava and the Goliska Morava, which unite into the Velika Morava. The Binacka Morava's tributaries are the Veternica, Jablanica, Toplica, Vlasina, Nisava, and the Moravica; the Goliska Morava's tributaries are the Ibar, Veliki Rzav, Cetina, Cernica, Gruza, and the Rasina. The tributaries of the Velika Morava are the Jasenica, Resava, and the Lepenica.

The Drava, a river of the Alpine type, carries large masses of sediment and has shifting rapids and bed. Its tributaries are the Zinja, Mura, Bednja, and the Karasica.

The Tisa, which enters the Danube at Titel, is a meandering river. Since its bed has been regulated with canals and dikes, its depth is quite substantial (about 8 meters). The Tisa's tributaries are the Zlatica (Aranka) and the Begej, which is a canalized river.

In addition to these, the Danube has several smaller tributaries: the Timok (originates with the Svriljski Timok and Trgoviski Timok), the Mlava, Pek, and Porecka Reka in eastern Serbia, the Tamis, Krasava, and Mera in the Banat, and the Vuks in Slavonia. The Danube's tributaries, the Drava, and Sava, and the Drina, a tributary of the Sava, carry in their upper reaches large masses of water because they come from regions rich in atmospheric precipitation. The Drava is at its highest stage in summer. In other rivers of the Black Sea drainage area, the two highest stages are in spring and autumn. There are wide differences in the fall of these rivers. The Danube, Tisa, and the Sava have a gradual fall. All those rivers which flow through mountain regions have an abrupt fall. All rivers of this drainage area have great potential power, especially the Danube in the Djerdap Gorge, and the Drava and Drina with its tributary the Lim.

2. Rivers of the Adriatic Drainage Area

These rivers are short and rapid, influenced by the high Dinaric Mountains which are parallel to the wide coast. Starting from the south, the most important rivers of this drainage area are the following:

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The Drim, which originates from the confluence of the Beli Drim and Crni Drim rivers. The Beli Drim flows through the fertile Metohija area where many tributaries empty into it: the Pecka, Decanska, Prizrenska Bistrica, the Erenik, Klima, and the Istok. The upper reaches of the Crni Drim belong to Yugoslavia. Originating in Lake Ohrid, its only tributary is the Radika coming from Mavrovo.

The Moraca flows into Lake Scutari, where the Bojana originates (the Moraca's tributaries in the Zeta plain are the Zeta and the Cijevna. The Crnojevic and the Crmnica also flow into Lake Scutari).

The Neretva enters the Adriatic Sea, forming a delta after having penetrated through canyons of the Cvrnica and Prenj (receiving on its way the flow from the tributaries Rama, Trebizat, Bregova, and Buna).

The Cetina cuts between Mosor and Biokovo mountains. There are large waterfalls, 48 meters high, called the Velika Gubavica and the Mala Gubavica, at Zadvarje.

There are many waterfalls on the Krka and its tributary the Cikola, including the Manojlovac (85 meters) and Skradinski Buk (45.7 meters) falls.

The Zrmanja flows through Novigradsko More and Karan lake; its largest waterfall is Dravlji Brod.

The Mirna, Lita, Rasa, and the Soca, with the tributaries Idrija and Vipava, as well as some shorter rivers, such as the Recina in Rijeka and the Ombla, flow into the Adriatic.

The rivers of the Adriatic drainage area have an abrupt fall. They have two maximum stages -- in spring (April), and late in autumn (November), when the snow melts and when there is much rain. The lowest stages are in summer (August) and in winter (February).

3. Aegean Sea Drainage Area

The Vardar and the Strumica belong to the drainage area of the Aegean Sea. The Vardar, the principal river of this drainage area, flows through a number of valleys and defiles. Consequently, its fall is very irregular. In defiles (Derven, Tagorska Klisura, Demir Kapija) the fall is considerable, and in the valleys (Polos, Skoplje, Djevdjelija) it is more gradual. The principal tributaries of the Vardar, on the left side are the Lepenac, Pcinja, and the Bregalnica; on the right side, the tributaries are the Treska, Topolka, Babuna, and the Crna Reka. The Crna Reka, the largest tributary, flows through the wild Stocivir defile and through Kavadarci.

Principal Rivers of Yugoslavia

<u>River</u>	<u>Length</u> (km)	<u>Drainage Area</u> (sq km)	<u>Navigable Length</u> (km)
Danube	591*	176,980	591
Sava	940	94,694	592
Morava (Velika and Juzna)	568	36,637	--
Drina	461	19,677	--
Drava	311	11,573	151

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<u>River</u>	<u>Length</u> (km)	<u>Drainage Area</u> (sq km)	<u>Navigable Length</u> (km)
Bosna	308	10,400	--
Kupa	296	11,484	136
Zapadna Morava	295	16,124	--
Una	255	7,285	--
Vardar	246	21,925	--
Ibar	241	8,389	--
Vrbas	240	5,406	--
Lim	220	**	--
Neretva	208	5,581	20
Tisa	207	9,568	164
Bosut	186	3,025	40
Begej	164	**	164
Beli Drim	156	7,424	--
Tara	140.5	**	--
Tamis	121	2,834	3
Krka	111	1,997	15

* Figure represents the length of the Danube within Yugoslavia.

** No data available.

Yugoslavia has several underground rivers. The best known are the underground rivers in the area of Dinaric karst. The Ljubljanka is prominent among them (it flows through Postojna grotto as the Pivka, appears on the surface as the Unac River, goes underground south of Logatec, and appears again on the surface as the Ljubljanka). There are several underground rivers in Lika (the Lika with its tributary the Jadova, the Gacka, and the Krkava), and in other parts of the karst regions (the Suvica in Duvanjsko Polje, the Zalomka Reka in Nevesinjsko Polje, and the Murska in Gatačko Polje). The most typical underground river in Yugoslavia is the Trebisnica in Popovo Polje, which finally appears on the surface as the Ombla.

Lakes

There are many lakes in Yugoslavia of widely varying origin, but they can be classified as ice, tectonic, karst, and river lakes.

Lakes of ice origin are the most numerous but also the smallest. They are located in high mountains where the glaciers were developed. They differ as to location and formation. Some are very deep (1,800-2,400 meters), in the form of whirlpools. These are small lakes, surrounded by high mountains. The water is of a beautiful blue color, and the people call them "mountain eyes." The other group of ice lakes is located in mountain valleys. The lakes were formed by the movements of glaciers. Mostly they are at the end of the glacier bed, at the point to which the glacier extended and where it melted. Of such origin are Lake Plava, Lake Bled, and others. Most of the ice lakes are located on high mountains on Triglav (seven small lakes), Durmitor (Lake Crno and Lake Zmijanje), Bjelasica (Lake Biograd, Lake Pesica, and Lake Rikovac), Sar Planina (14 lakes), and on Perister (name of lake not given). In addition, there are some lakes on Sator, Prenj, Treskavica, Zelengora, and Volujak mountains.

Tectonic lakes are in valleys. They are large and deep. Ohrid, Prespa, and Doiran lakes belong to this type.

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Lake Ohrid, which is 695 meters above sea level, has an area of 366.74 square kilometers (247.76 square kilometers belong to Yugoslavia and 118.98 to Albania). It is the deepest lake on the Balkan Peninsula, not only in maximum depth (285 meters) but also in average depth (145-150 meters). It is also, with regard to water volume, the largest lake (20 times larger than Lake Scutari). Lake Ohrid receives its water mostly from springs on its periphery. Among these the largest spring is at Sveti Naum, delivering 30-40 cubic meters a second. Since the water contains hardly any suspended particles, it is very clear and transparent (transparency to 18.3 meters). The water temperature is 18 to 22 degrees centigrade.

Lake Prespa is 853 meters above sea level and has an area of 285.4 square kilometers (186.2 square kilometers belong to Yugoslavia, 49.4 square kilometers to Albania, and 47.8 to Greece). It has surface tributaries, and its water disappears into the Zavir abyss and into several others. It flows underground under the rocky Galicica River, and its water appears on the surface through the springs on the periphery of Lake Ohrid. The maximum depth of Lake Prespa is 54.9 meters.

Lake Doiran, located in a hilly area below Belasica Mountain, is the smallest tectonic lake. It has an area of 42.7 square kilometers (27.12 square kilometers in Yugoslavia and 15.58 in Greece) and is 10 meters deep.

In karst areas, karst lakes developed which differ in origin. The smallest ones were formed by sinkholes, such as Lake Modro Oko west of Opuzen, Lake Savino in Prokletije south of Gusinje, Lake Zagubicko Vrelo, Lake Ponikva on Krk Island.

Some karst (river karst) lakes developed in river valleys as a sequel to partition formations. Thus two lakes were formed on the Pliva River, and the 16 Plitvice lakes on the Korana River. The Plitvice lakes are situated in terraces between 522 and 632 meters above sea level. The largest of these lakes are Lake Froschan and Lake Kozjak. Lake Svica at Otocac is of the same origin.

Some karst lakes were formed through depressions of the Dinaric mainland below sea level (crypto depressions). Lake Vrana in Dalmatia belongs to this type, and also other smaller lakes in the lower reaches of the Neretva River and around the mouth of the Bojana River.

The largest crypto-depression is Lake Scutari. It is the largest lake on the Balkan Peninsula. The area at low water level is 369.72 square kilometers (221.47 square kilometers in Yugoslavia and 147.8 in Albania). It is about 42 kilometers long and up to 14 kilometers wide. In spring and autumn, when the water level rises 2.5 to 3 meters, the area increases to 530 square kilometers. The average depth of Lake Scutari is between 4 and 7 meters, but there are some places in it ("eyes") which are 8 to 44 meters deep. Since it is 6 meters above sea level and the maximum depth is 44 meters, its bottom in some places is 38 meters below sea level. The area of Lake Scutari has been increasing during the last hundred years since one branch of the Drim enters the Bojana shortly after leaving the lake. The Drim fills the river bed of the Bojana with earth and impedes the normal flow of water.

The Prokjan lakes, at the mouth of the Krka near Karinsko More, and Novigrad More were formed in a valley depression.

In addition, in the Dinaric karst, there are fields and small valleys which are temporary lakes, especially in spring and autumn because the abysses are not capable of carrying off the accumulated water. The duration of flood depends upon water influx and upon the capacity of the abysses. Lake Crno is

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flooded for 10 months, Mostarsko Blato [a marsh] is flooded from December to the end of April. Glamocko Polje, Dabarsko Polje, and Fatnicko Polje are flooded from 6 to 7 months. Among these, Popovo Polje is very well known. Its lowest part is flooded from mid-October to the beginning of July. The water is 27.6 meters deep. The water flows faster from Kupresko Polje, Gatacko Polje, and Duvanjsko Polje. Some fields, small valleys, and sinkholes are flooded only several days.

River [oxbow] lakes originate from meander-loops of the big rivers in the Pannonian basin. Most of these lakes receive a fresh water supply during floods but some have bottom springs. Their appearance is that of a swamp and their water is salty. The most typical among these alkaline-muriatic lakes are Lake Palic (6.96 square kilometers) in Backa, and Lake Rusanđa (1.52 square kilometers) in the Banat.

Area, Depth, and Elevation
of Yugoslav Lakes

<u>Lake</u>	<u>Area</u> (sq km)	<u>Max Depth</u> (m)	<u>Elevation Above</u> <u>Sea Level</u> <u>/meters/</u>
Scutari	369.72	44	6
Ohrid	366.74	286	695
Prespa	285.40	35	853
Doiran	42.70	10	149
Vrana	30.15	4	1
Prokhan	11.45	20	09
Palic	4.20	3.5	101
Bohinj	3.14	45	523
Plitvice	1.98	49	522-632
Bled	1.36	45	475
Plav	1.20	9	901
Durmitor lakes (17 lakes)	0.95	*	1,410-2,016
Bjelasic lakes (4 lakes)	0.55	*	1,120-1,890
Svica	0.57	35	424
Crno	0.57	47	1,440
Sar Planina lakes (14 lakes)	0.12	*	1,330-2,470
Triglav lakes (5 lakes)	0.07	*	1,340-2,002

* Data unavailable.

CLIMATE

According to the geographic latitude, Yugoslavia should have a Mediterranean climate, and also because it is situated close to the sea. However, the republic has various climates because the surrounding mountains prevent the sea's influence from being felt deeper in the hinterland and because the larger part of Yugoslavia extends northward so that it is exposed to the penetration of colder climate. In addition to the moderate continental and Mediterranean climates, there are various climatic subtypes: modified Mediterranean, Alpine, sub-Alpine, and moderate continental.

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Average Annual and Monthly Temperatures

Weather Station	Elevation Above Sea Level /meters/	Annual	Monthly											
			I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Split	17	15.7	7.0	7.8	10.5	14.2	18.5	22.5	25.6	24.8	20.9	16.8	11.8	8.1
Mali Losinj	10	15.1	7.3	7.6	9.7	13.1	17.3	21.5	24.4	23.1	19.9	16.2	11.9	9.0
Mostar	59	14.8	4.8	6.3	9.8	13.4	17.6	22.0	25.4	24.8	20.4	15.6	10.2	6.9
Titograd	42	14.7	3.7	4.0	9.1	14.3	18.3	22.1	26.9	26.4	20.7	15.5	9.2	5.9
Rijeka	5	13.5	5.0	5.9	8.5	12.3	16.4	19.9	22.8	22.2	18.4	14.3	9.5	6.6
Skoplje	245	11.8	1.4	1.2	7.3	11.8	16.7	20.4	23.2	22.3	19.1	13.9	6.1	1.1
Bitolj	617	11.7	0.9	2.7	6.7	11.1	16.4	19.7	22.1	21.9	18.3	13.3	6.4	2.5
Belgrade	138	11.3	0.7	1.0	6.6	11.4	16.6	19.7	21.8	21.2	17.1	12.4	6.2	1.9
Zagreb	162	11.2	0.0	2.0	6.8	11.6	16.2	19.5	21.8	20.8	17.0	11.7	6.0	1.6
Pazin	260	11.1	1.5	2.9	6.0	10.5	15.0	18.6	21.1	20.0	15.9	11.5	6.3	3.5
Osiijek	96	10.9	0.9	0.9	6.3	11.3	16.4	19.5	21.7	20.5	16.5	11.4	5.5	1.3
Vranje	502	10.7	2.6	1.5	6.3	10.8	15.7	18.7	20.9	21.2	17.7	11.8	5.3	1.5
Kragujevac	182	10.7	0.8	0.9	5.4	11.2	15.8	19.7	21.7	20.3	16.5	12.2	4.8	0.9
Banja Luka	163	10.6	1.1	1.7	6.6	10.5	15.4	18.8	20.6	19.8	15.8	11.6	5.7	2.0
Cetinje	672	10.1	0.2	0.9	4.9	10.1	13.5	17.3	21.2	20.8	15.4	10.6	5.1	1.3
Sarajevo	657	9.1	2.6	0.3	4.9	9.6	13.5	16.6	18.7	18.2	14.7	10.7	4.7	0.7
Maribor	297	9.1	2.3	0.2	4.1	9.5	14.4	18.0	20.0	18.7	14.8	9.9	3.4	0.3
Krsko	168	9.0	2.6	0.1	4.8	8.9	13.5	17.5	19.0	18.5	14.2	10.0	3.5	1.0
Ljubljana	290	9.0	2.5	0.2	4.0	9.5	13.9	17.7	19.6	18.6	14.8	10.1	3.8	1.3
Gospic	565	8.6	1.9	1.2	3.7	8.3	13.1	16.6	18.8	18.2	13.9	9.2	4.5	0.2
Titovo Uzice	424	8.4	2.8	2.0	3.4	8.7	13.6	16.7	18.8	16.9	14.0	11.5	3.5	0.9
Kolasin	945	7.2	2.5	0.9	1.8	7.1	10.2	13.6	17.4	16.2	12.2	8.5	3.4	0.4
Bjelasnica	2,067	0.3	0.6	8.2	5.7	2.5	2.6	6.7	9.0	9.1	5.9	2.7	2.6	5.4

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The Adriatic coast has a Mediterranean climate. Its characteristics are high annual temperatures, very mild winters, and hot summers. The temperature increases southward. The average January temperature in Rijeka is 5.3 degrees centigrade; in Ostri Rit (south Adriatic), it is 9.2 degrees centigrade. This condition changes in July: in Rijeka, it is 22.9 degrees centigrade; in Ostri Rit, it is 25.4 degrees centigrade. Autumn is 2 to 4 degrees warmer than spring. This zone has maximum precipitation in the winter half of the year.

The influence of the Mediterranean climate is felt in the valleys of the Moraca, Neretva, and Krka rivers, and on karst highlands (Sinjsko Polje, Imotsko Polje, Ljubusko Polje, and other plains). This is not the genuine Mediterranean climate, but, through the influence of the continent, a modified Mediterranean climate. Winters are colder and summers are warmer than in the coastal area. Titograd, with the warmest summer in the republic (the average July temperature is 56.9 degrees centigrade), has temperatures 2.7 degrees higher than Ulcinj. Also, Mostar has summer temperatures 1.5 degrees higher than Dubrovnik. The temperatures at Mostar are influenced not only by the mainland, which warms up and cools off quicker than the sea, but also by clear skies and bare rocks which help the air to warm up quickly.

The warm influence of the Aegean Sea is felt along the Vardar River to Demir Kapija, and on a somewhat lesser scale in Kavadarci, and in the Strumica and Bregalnica river valleys. But these temperatures are lower than they should be according to the geographic latitude, the elevation above sea level, and the sea influence. For instance, Udovo has an average July temperature of 25.4 degrees centigrade while the annual temperature fluctuations are considerable. All this is caused by the cooling influence of the Vardarac wind [northerly wind of the Vardar region].

Most of the other parts of the country have moderate central European climate. However, there are, within that large area, some climatic differences. The winter temperatures suddenly decrease from the southwest toward the northeast. The changes in temperatures going from west to east are shown by the following table (in degrees centigrade):

	<u>Zagreb</u>	<u>Osijek</u>	<u>Frontier (Nincicevo)</u>
Average January temperature	-0.6	-1.1	01.9
Average July temperature	21.0	22.6	23.2

The temperature variations are greater in the northeast parts of the country than in the northwest and central areas. In the Vojvodina very often the temperature drops to below -25 degrees centigrade in winter and rises to 33 degrees centigrade in summer, and in sandy sections up to 65 degrees. This area has the greatest extremes in temperature in Yugoslavia.

The Alpine climate is found not only in the Yugoslav Alps but also in the other high mountains. The temperature is rather low, winters are long and cold, and summers short and cool. The average annual temperature on Bjelasnica mountain (2,067 meters) is 0 degrees centigrade; the average January temperature is -8.9 degrees; the average in April is -1.8, in July 9.9, and in October 2.8 degrees.

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Sub-Alpine climate is characteristic for the plains surrounded by high mountain ranges. Heavier, colder air settles here in winter during temperature inversions so that it is warmer in the mountains than on these plains. Such phenomena can be observed in the plains in Lika, Kupres, and Glamoc.

There are valleys in the central mountain massive of Yugoslavia, protected from cold winds and with a very mild climate (Metohija, Polog, Toplica, Krusevacka Zupa, and the valleys along the Drina, Lim, and Ibar). Such is the climate of the Ohrid valley, which is favorably influenced by the lake water.

Atmospheric Precipitation

Atmospheric precipitation is very unevenly distributed. There is very much rain in some areas, and very little in others. This is influenced by the variations in relief. The mountain areas above Boka Kotorska (Crkvice in Krivosije, 460 centimeters) have the highest amount of precipitation, not only in Yugoslavia, but also in Europe. The Slovenian high mountains, Velebit and Gorski Kotar, also have much precipitation: 180-300 centimeters annually. The amount of precipitation increases from the coast toward the mountains, and decreases from the mountain ranges north-eastward. The islands have 50-95 centimeters of rain on the average. In the coastal areas and the Primorje and the highlands above, it reaches 90-290 centimeters. This obtains up to the Glamoc-Bilece line. Northeastward of the high mountain ranges, the average atmospheric precipitation is 111-120 centimeters (central and western Bosnia, Herzegovina, and southwest Croatia). Further to the southeast, in western Serbia, and in Stara Raska in northeastern Montenegro, the precipitation averages from 90 to 100 centimeters; in Sumadija, Pomoravlje, and Gornje Povoljarske, 60 to 70 centimeters; in Podunavlje, eastern Serbia and southern Povoljarske, 60 centimeters and below. Kavadarci (Macedonia) has the lowest amount of precipitation in the entire country (about 44-46 centimeters).

The quantity of atmospheric precipitation is not evenly distributed throughout the year. This is the result of varying atmospheric pressures in different seasons.

The islands in the Primorje, and Macedonia have the greatest rainfall in winter and autumn, and much less in summer. In the interior of the country in the northeast, the opposite prevails with rain being heavier during the summer. The dividing line between the Mediterranean and Central European rain areas goes along the mountain ridge of Karavanke eastward to the Ivancica mountains, from there to the Kozara mountains and toward Bjelasica Mountain (Montenegro) and Skopska Crna Gora, and further over Vardenik Mountain, to the Bulgarian frontier. There are in both sectors certain transitions and differences in maximum and minimum of precipitation. For instance, in the northern parts of Slovenia, belonging to the Alpine rain region, precipitation reaches its maximum during the warmest month, July, and its minimum in January and February. Twenty-seven percent of the precipitation is in spring and 30 percent in summer. This precipitation distribution is very favorable for agriculture. The rain distribution in the central parts of Yugoslavia, between Travnik, Visegrad, and Foca, is very even. The difference between minimum precipitation and maximum precipitation is not higher than 3.5 percent.

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Average Annual and Monthly Atmospheric Precipitation

Weather Station	Elevation Above Sea Level /meters/	Annual	Monthly											
			I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Cetinje	672	3,452	339	362	429	294	153	149	34	40	115	455	559	523
Fuzine	764	2,892	214	209	296	252	212	215	128	135	232	385	338	276
Kolasin	945	2,670	331	182	270	264	150	104	48	104	176	312	379	156
Bjelasnica	2,067	1,967	184	181	203	205	169	147	107	106	135	186	163	181
Gospic	563	1,810	145	139	154	156	118	112	93	83	152	251	211	186
Titograd	42	1,656	141	132	248	148	108	97	43	26	63	283	195	272
Rijeka	5	1,593	100	97	128	120	119	128	76	104	171	225	174	151
Ljubljana	290	1,539	73	71	102	137	121	148	117	146	190	148	190	96
Mostar	59	1,247	102	94	120	129	93	71	46	53	96	158	142	143
Pazir	260	1,181	70	76	93	82	113	107	90	75	110	148	107	116
Banja Luka	163	1,060	64	57	71	103	115	119	88	84	88	114	80	77
Mali Losinj	10	1,036	74	83	78	80	74	58	50	43	110	132	135	131
Maribor	297	1,022	38	50	60	81	74	132	167	100	142	96	88	54
Krsko	168	1,014	46	57	77	86	91	98	82	97	108	111	98	63
Split	17	900	80	64	82	77	65	54	31	41	75	113	106	112
Zagreb	16.	900	49	44	59	70	84	96	81	84	85	105	80	63
Sarajevo	637	888	61	60	69	73	82	91	60	67	81	97	78	69
Titovo Uzice	424	853	51	51	62	68	99	123	91	49	54	64	73	55
Osijek	96	711	42	35	51	69	79	84	60	61	57	71	56	46
Bitolj	617	666	47	54	74	77	53	38	17	34	40	55	76	101
Kragujevac	182	629	40	58	36	50	68	87	50	49	38	48	60	45
Belgrade	138	623	33	33	37	60	71	74	61	52	44	56	49	44
Vranje	502	524	33	29	48	43	52	57	32	38	34	48	47	58
Skoplje	245	443	26	32	38	44	54	45	17	21	27	44	45	50

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WINDS

Winds appear as the sequel of the general distribution of atmospheric pressure. The characteristic winds are: the bura [blows from north or north-east], silok or south wind, kosava [east], and vardarac [northerly winds of the Vardar region].

The bura blows from the cold Dinaric Mountains toward the sea in winter. It is the result of differences in temperature and atmospheric pressure between the high mountains and the sea. Where the differences are greater, as below the Velebit or Biokovo mountains, the bura is stronger. The velocity of the bura varies between 16.5 and 33 meters per second, but some gusts are stronger, between 50 and 60 meters per second. This wind can completely paralyze shipping in some bays and ports exposed to it.

The silok or south wind blows during cold months. Since it comes from the warmer regions, it is warm and moist, bringing thick clouds and rain which falls in showers. The silok is not as strong as the bura, but it is a vigorous wind. The average velocity is 5-6.5 meters per second. In addition, it blows continuously at a steady velocity for several days.

The kosava is a strong and cold southeast wind which blows during the cold seasons of the year in the area east of the Tisa, the middle Danube, and the Morava rivers. It starts mostly when there is a developed anticyclone over central and southern USSR and a barometric depression in the southwest. The kosava blows in gusts. Its average velocity is 5-11 meters per second, but some gusts can reach a velocity of 27.5 meters per second. This wind reaches its highest strength between Veliko Gradiste and Belgrade. When it is very strong, it is felt at Sremska Mitrovica, Nis, and Pirot.

The vardarac blows from the Sar Planina and Skopska Crna Gora toward the Aegean Sea. It is the result of the difference between the atmospheric pressures over the mainland and over the sea. The atmospheric pressure is higher over the Balkan Peninsula than over the Aegean Sea during the winter period. The vardarac moves from the north to the south along the Vardar valley; however, it is affected by the relief, so that it blows sometimes in various sections in different directions. The vardarac is vigorous and cold in winter and mild and fresh in summer. The average velocity is 5.7 meters per second during the winter period, but sometimes substantially higher.

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